

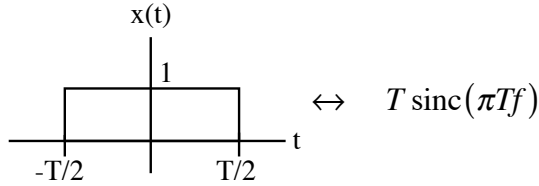
Table of Fourier Transforms

$$x(t) = \int_{-\infty}^{\infty} X(f) e^{j2\pi ft} df$$

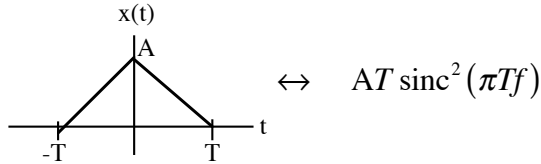
$$X(f) = \int_{-\infty}^{\infty} x(t) e^{-j2\pi ft} dt$$

1. Transformation	$x(t) \leftrightarrow X(f)$
2. Linearity	$a_1 x_1(t) + a_2 x_2(t) \leftrightarrow a_1 X_1(f) + a_2 X_2(f)$
3. Symmetry	$X(f) \leftrightarrow x(-t)$
4. Scaling	$x(at) \leftrightarrow \left(\frac{1}{ a }\right) X\left(\frac{f}{a}\right)$
5. Delay	$x(t-a) \leftrightarrow e^{-j2\pi fa} X(f)$
6. Modulation	$e^{j2\pi at} x(t) \leftrightarrow X(f-a)$
7. Convolution	$x_1(t) * x_2(t) \leftrightarrow X_1(f) X_2(f)$
8. Multiplication	$x_1(t) x_2(t) \leftrightarrow X_1(f) * X_2(f)$
9. Time Differentiation	$x^{(n)}(t) \leftrightarrow (j2\pi f)^n X(f)$

10. Rectangular Pulse



11. Triangular Pulse



12. Impulse Function

$$k\delta(t) \leftrightarrow k$$

13. Constant

$$k \leftrightarrow k\delta(f)$$

14. Cosine

$$\cos 2\pi f_o t \leftrightarrow \left(\frac{1}{2}\right) [\delta(f-f_o) + \delta(f+f_o)]$$

15. Sine

$$\sin 2\pi f_o t \leftrightarrow \left(\frac{j}{2}\right) [\delta(f+f_o) - \delta(f-f_o)]$$

16. Complex Exponential

$$e^{j2\pi at} \leftrightarrow \delta(f-a)$$

17. Integration

$$\int_{-\infty}^t x(\tau) d\tau \leftrightarrow \frac{X(f)}{j2\pi f}$$

18. Periodic Functions

$$\sum_{k=-\infty}^{\infty} X_k e^{jk2\pi f_o t} \leftrightarrow \sum_{k=-\infty}^{\infty} X_k \delta(f - kf_o)$$

$$P_{av} = |X_0|^2 + 2 \sum_{k=1}^{\infty} |X_k|^2$$

$$\text{Energy} = \int_{-\infty}^{\infty} |X(f)|^2 df = \int_{-\infty}^{\infty} x^2(t) dt$$

$$\text{Exponential Fourier Series: } X_n = \frac{1}{T} \int_0^T x(t) e^{-jn2\pi f_o t} dt$$